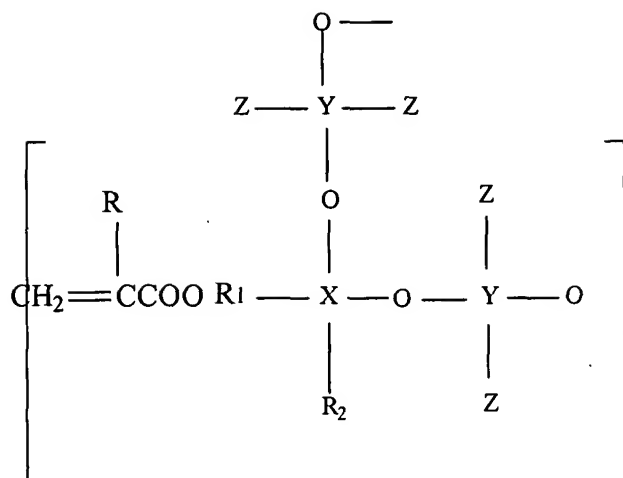


## **CLAIMS**

1. A process for producing a non-aqueous sol-gel spin-on glass material comprising a hybrid glass/polymer material by reacting an alkyl or dialkyl substituted trialkoxysilane or dialkoxysilane with a silane diol, wherein said alkyl group has from 1 to 8 carbon atoms.
2. The process of claim 1, wherein the silane diol is a diphenylsilanediol, a 1,3-Bis (3-hydroxypropyl)tetramethyldisiloxane, a 1,3-Bis (4-hydroxybutyl)tetramethyldisiloxane, a fluorinated silane diol, or a mixture of one or more of these silane diols.
3. The process of claim 1, wherein the alkyl group is replaced with a methacryloxypropyl, acryloxypropyl, or epoxy moiety.
4. The process of claim 1, wherein the trialkoxysilane or dialkoxysilane has one or more C<sub>1</sub> to C<sub>8</sub> alkyl, methacryloxypropyl and/or alkoxy groups on the same molecule.
5. The process of claim 1, wherein the trialkoxysilane or dialkoxysilane has 1 to 3 C<sub>1</sub> to C<sub>8</sub> alkyl, methacryloxypropyl and/or alkoxy groups on the same molecule.
6. The process of claim 1, further comprising adding an inorganic or organic dopant.
7. The process of claim 6, wherein the dopant comprises a phosphor dopant.
8. The process of claim 7, wherein the dopant comprises a YAG base phosphor, a moisture sensitive phosphor, nano-particles, or an organic material selected from organic dyes or metal complexes.
9. The process of claim 1, further comprising adding a UV light blocking material and/or an oxygen scavenger.

10. The process of claim 1, further comprising adding a light-scattering material.
11. The process of claim 1, further comprising adding a coupling agent.
12. The process of claim 11, wherein the coupling agent is a dibutoxyaluminoxetriethoxysilane, a mixture of zirconium isopropoxide and methacrylic acid, or another transition metal propoxide.
13. The process of claim 1, comprising the reaction of an alkoxy silane with an organic diol in a non-aqueous medium in the presence of a catalyst.
14. The process of claim 13, wherein the catalyst is a tin catalyst.
15. The process of claim 13, wherein the catalyst is dibutyltin diluarate, titanium isopropoxide, acetic acid or trifluoroacetic acid.
16. The process of claim 1, further comprising adding a coupling agent.
17. The process of claim 16, wherein the coupling agent is a dibutoxyaluminoxetriethoxysilane, a mixture of zirconium isopropoxide and methacrylic acid, or another transition metal propoxide.
18. A non-aqueous sol-gel spin-on glass material comprising a hybrid glass/polymer material selected from the group having the following formulas:

**Formula I**



Where **R**= Hydrogen, Alkyl, Halogenated Alkyl

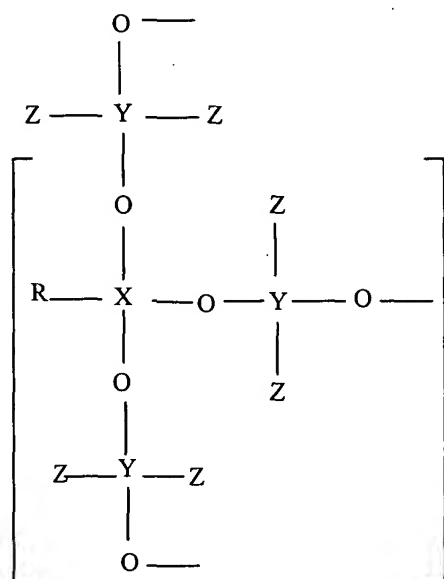
**R**<sub>1</sub>= Alkyl, Halogenated Alkyl, Phenyl, Halogenated Phenyl

**R**<sub>2</sub>= Alkyl, Methyl, Ethyl

**X, Y**= Si, Ge, Ti, Sn

**Z**= Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

**Formula II**

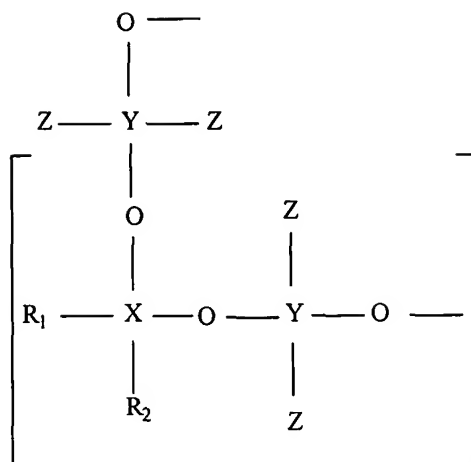


Where **R**= Aryl (C<sub>1</sub>-C<sub>8</sub>), Phenyl, Substituted Phenyl

**X, Y**= Si, Ti, Ge, Sn

**Z**= Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

### Formula III



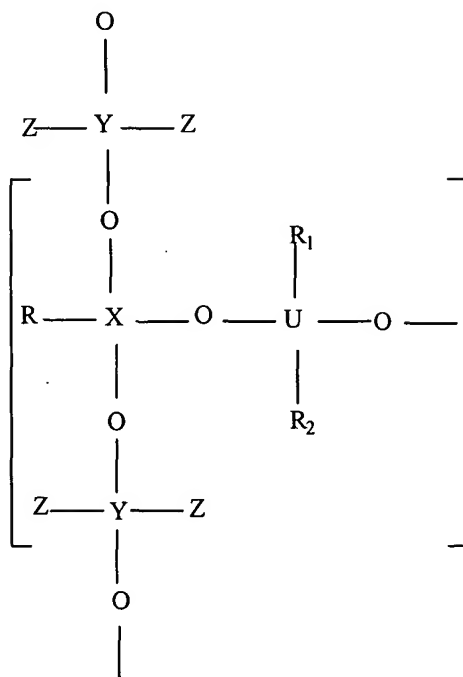
Where  $\text{R}_1$  = Phenyl, Ethyl, Propyl, Trifluoropropyl

$\text{R}_2$  = Methyl, Ethyl

$\text{X}, \text{Y}$  = Si, Ge, Ti, Sn

$\text{Z}$  = Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

### Formula IV



Where  $\text{R}$  = alkyl ( $\text{C}_1$ - $\text{C}_8$ ), phenyl, Substituted Phenyl

$\text{R}_1$  = Alkyl, Phenyl,

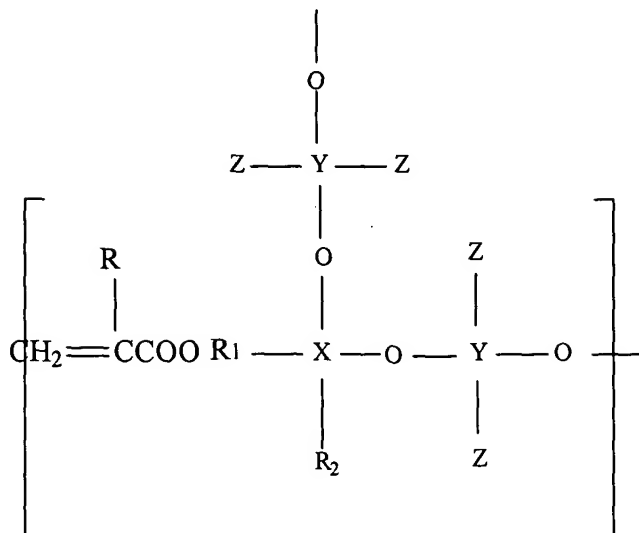
$\text{R}_2$  = alkyl, Phenyl

$\text{X}, \text{U}, \text{Y}$  = si, Ge, Ti, Sn

$\text{Z}$  = Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

19. The non-aqueous sol-gel spin-on glass material of claim 18, having the following formula:

**Formula I**



Where R= Hydrogen, Alkyl, Halogenated Alkyl

R<sub>1</sub>= Alkyl, Halogenated Alkyl, Phenyl, Halogenated Phenyl

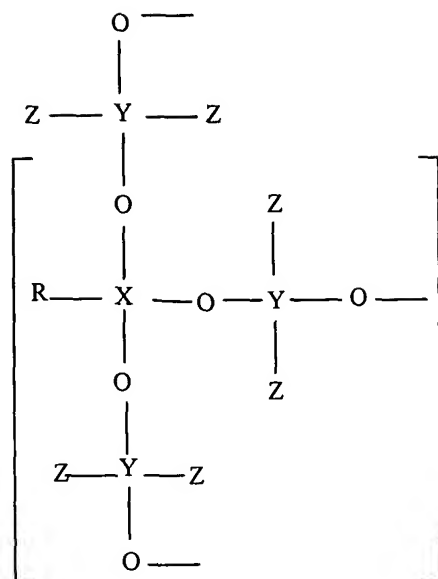
R<sub>2</sub>= Alkyl, Methyl, Ethyl

X, Y= Si, Ge, Ti, Sn

Z= Alkyl, Substituted Alkyl, Phenyl, Substituted phenyl

20. The non-aqueous sol-gel spin-on glass material of claim 18, having the following formula:

**Formula II**



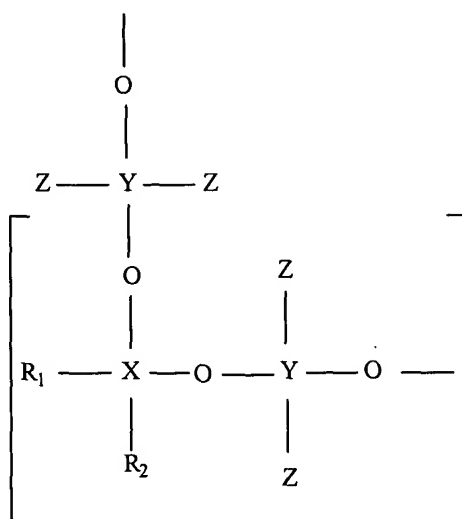
Where R= Alkyl, Substituted Alky, Phenyl, Substituted Phenyl

X, Y=Si, Ti, Ge, Sn

Z= Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

21. The non-aqueous sol-gel spin-on glass material of claim 18, having the following formula:

**Formula III**



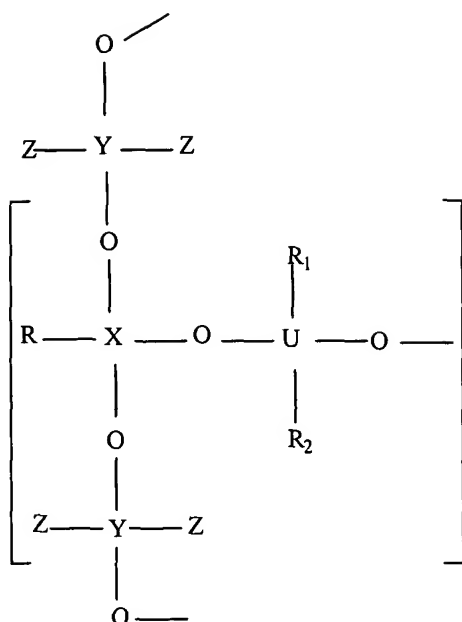
Where R<sub>1</sub>= Phenyl, Propyl, Ethyl, Trifluoropropyl

R<sub>2</sub>= Methyl, Ethyl

X, Y= Si, Ge, Ti, Sn

22. The non-aqueous sol-gel spin-on glass material of claim 18, having the following formula:

# Formula IV



Where  $\text{R}_1$  = Alkyl ( $\text{C}_1$ - $\text{C}_8$ ), Phenyl, substituted phenyl

$\text{R}_1$  = Alkyl, Phenyl

$\text{R}_2$  = Alkyl Phenyl

$\text{X}$ ,  $\text{U}$ ,  $\text{Y}$  = Si, Ge, Ti, Sn

$\text{Z}$  = Alkyl, Substituted Alkyl, Phenyl, Substituted Phenyl

23. The non-aqueous sol-gel spin-on glass material of claim 17, further comprising an inorganic or organic dopant.
24. The non-aqueous sol-gel spin-on glass material of claim 22, wherein the dopant comprises a phosphor dopant.
24. The non-aqueous sol-gel spin-on glass material of claim 22, wherein the dopant comprises a YAG base phosphor, a moisture sensitive phosphor, nano-particles, or an organic material such as an organic dye or a metal complex.
25. The non-aqueous sol-gel spin-on glass material of claim 17, further comprising a UV light blocking material and/or an oxygen scavenger.

26. The non-aqueous sol-gel spin-on glass material of claim 17, further comprising a light-scattering material.
27. A process for patterning the non-aqueous sol-gel spin-on glass material of claim 17 comprising: a) coating a substrate with said material followed by soft baking at 110°C (1hr), 120°C (1-2 hr); b) exposing the coated substrate of step a) to UV illumination in a desired pattern; c) post-exposure baking the coated substrate of step b) at a temperature from 100°C to 120°C for 30 to 60 minutes; d) cooling the coated substrate of step c) to room temperature; e) removing the non-exposed areas of the coating on the coated substrate of step d); f) drying the coated substrate of step e); g) hard baking the coated substrate of step f) at a temperature from 120 °C and 150 °C for 1 to 3 hours.
28. The process of claim 27, wherein the non-exposed areas of the coating on the coated substrate are removed by developing in a suitable organic solvent.
29. The process of claim 28, wherein in step e) the organic solvent is tetrahydrofuran, methylethylketone, acetone, n-propylacetate, or mixture of these solvents.
30. The process of claim 27, wherein in step f) the coated substrate is dried by flushing with a non-reactive gas.
31. The process of claim 27, wherein in step a) the substrate is glass, quartz, sapphire, silicon, a metalized substrate or a polymeric film.
32. The process of claim 27, wherein in step a) the coating is carried out by spin coating, dip coating, spray coating or doctor blade coating.